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# PROPERTY RIGHTS AND ARTISANAL DIAMOND DEVELOPMENT (PRADD) – LIBERIA

BASELINE SURVEY: RESULTS AND ANALYSIS



DECEMBER 2011

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**COVER PHOTO:**

Mine owner Ms. Yata Varney supervising her “diamond boys” near Lofa Congo, Liberia. Photo Credit: Bocar Thiam.

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## **DISCLAIMER**

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.



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# ACRONYMS AND ABBREVIATIONS

GDO	Government Diamond Office
KP	Kimberley Process
PRADD	Property Rights and Artisanal Diamond Development
USAID	United States Agency for International Development





# EXECUTIVE SUMMARY

The Property Rights and Artisanal Diamond Development (PRADD) Liberia project is a USAID-funded intervention to clarify property rights and extend training and outreach to small-scale diamond miners in two areas in Liberia. For the purposes of an impact evaluation following the conclusion of the project, a baseline survey of 826 artisanal diamond mining households in four areas of the country was conducted prior to the start of project implementation in January-February 2011. The survey includes a total of 144 questions, with sections covering household demographic information and economic activity, mining activities, conflicts and security, policy awareness and perceptions, household assets, and opinions on mining-related issues. The survey covered the two areas in which PRADD-Liberia activities will take place, as well as two additional sites designed to serve as control areas to form the basis for a comparison between outcomes in project and non-project areas.

The results show that in most cases, artisanal diamond mining is not a lucrative endeavor. Mining households in the study area tend to be poor, with an annual per capita income of US\$ 329. On average, each mining claim yielded \$1,335 during the 2010 mining season, with only 5.4 percent of mining claims yielding revenues in excess of \$5,000.

Most miners do not hold valid mining licenses for their claims. Nonetheless, miners subjectively attach a high degree of importance to having a license, as 98 percent said that having a license was “very important.” The reasons given most often were to prevent loss of the claims, avoid conflicts with the police and government, and avoid conflicts with other miners.

Familiarity with the Kimberley Process (KP) was very limited among the miners. Over half had never heard of the KP. Only 7 percent were able to correctly answer four questions on the provisions of the KP. The results suggest there is substantial scope for expanding awareness of the KP in the PRADD project area.

The survey results indicate that conflicts over mining claims are common in the study area, with 18.6 percent of miners reporting having had at least one conflict related to their claims. The most common source of conflict is over the boundaries of claims, which accounted for 44.2 percent of the observed conflicts. Disputes between local miners over who has rights to a particular claim were also common, while disputes with outsiders and disputes related to prospecting each accounted for 10.5 percent of the total conflicts. Miners also show significant concern about future conflicts, as 39.9 percent say they are “very worried” that they could have conflicts in the future.

Our analytical econometric results suggest that there are no substantial differences between the prices that miners receive given the quality of the diamonds. Thus, it does not appear to be the case that some miners are able to get better prices than others. However, diamond revenues are substantially higher for miners who sell to licensed brokers and register their diamonds with the Government Diamond Office (GDO).



# I.0 INTRODUCTION

Artisanal mining is an important source of livelihood throughout western and central Africa. In Liberia, small-scale alluvial diamond mining occurs primarily in the western and northern parts of the country, and plays an important role in local economies where diamonds are found. Diamonds are generally found in remote rural areas, and Liberia's history of civil conflict has meant that the sector has existed largely outside of the government's control. As a result, the majority of diamond mining in Liberia occurs informally. Mining rights are frequently insecure and disputes over claims are common. Small-scale miners have difficulty complying with the Kimberley Process (KP) and taking advantage of the market potential that the KP presents.

The Property Rights and Artisanal Diamond Development in Liberia (PRADD-Liberia) project is a USAID-funded initiative that seeks to address these concerns. It is intended to clarify property rights and extend training and outreach to small-scale diamond miners in rural areas of Liberia. PRADD-Liberia is expected to increase incomes and improve the living standards of beneficiaries throughout the artisanal diamond mining sector value chain, facilitate increased compliance with the KP primarily by increasing the amount of diamonds entering the formal chain of custody, as well as generating improved social and environmental outcomes in the project areas.



Training of the survey enumerators. Photo courtesy of Bocar Thiam.

Prior to the implementation of PRADD, a baseline household survey was conducted to assess conditions in the project area as well as to serve as a basis for evaluating the impacts of the project following its conclusion. The survey was administered to nearly 1,000 mining households in western Liberia, and contains a range of questions on mining activities, social and economic characteristics, and attitudes and beliefs. To our knowledge, this is the first large sample household survey of artisanal diamond miners that has been undertaken anywhere in the world. The purpose of this report is to present the results of the baseline survey as well as some analysis of the data and implications for future programming.



# 2.0 ARTISANAL DIAMOND MINING IN LIBERIA

In order to design the survey and evaluation, preliminary qualitative fieldwork was undertaken to understand the artisanal diamond mining value chain, identify the key outcomes of interest, and identify potential concerns or issues to be addressed in carrying out the survey. The results of this fieldwork are presented in this section as background for understanding the artisanal diamond mining sector as well as the design of the survey.

## 2.1 THE ARTISANAL DIAMOND MINING PROCESS

Artisanal diamond mining in Liberia occurs seasonally during the December-July dry season. The artisanal mining sector involves five categories of actors: miners, diamond boys, brokers, supporters, and dealers. A miner is an individual who asserts a mining claim and initiates mining activities on that claim. By law, artisanal mining claims are limited to 25 acres, though reportedly some are larger in practice. The process of mining a claim is to dig one or more pits on the claim. Most often, a pit is dug using shovels by teams of four diamond boys. The diamond boys have no particular specialized skills, and the tasks they perform are not differentiated. Where deeper pits are needed and miners have access to sufficient capital, pits may instead be dug using construction equipment. The soil is removed until a pocket of gravel is located beneath the surface. The gravel is then removed from the pit and “washed” using a jig, washing pan, and drums. It is during the washing process that diamonds are typically found. Diamonds are also sometimes found in the soil or in the process of removing the gravel from the pit.

The depth of a pit is measured in “shovels,” i.e., the length of a shovel from end to end, where one shovel is approximately 4.5 feet. There is uncertainty associated with the depth of the pit that will be needed to reach the gravel—while miners may have some indication based on other pits in the area, they do not know exactly how far down they will have to go. On average, each pit in the survey was 3.02 shovels deep, and required a team of four to five diamond boys approximately three weeks to fully exploit.

In order to mine, an initial investment of \$300-\$500<sup>1</sup> is generally needed to purchase a water pump that can be used repeatedly when pits are dug. In addition, each pit requires a substantial additional investment. A variety of equipment must be purchased: shovels for each of the diamond boys, a special type of shovel called a digger for extracting the gravel, a machete, replacement parts and gasoline for the water pump, as well as a jig, washing drums, and a washing pan for washing the gravel. Each diamond boy must also be provided with two cups of rice per day, cooking oil, and occasionally additional food or medicine in the event of illness or injury. The cost per pit depends on the depth required to reach the gravel, as deeper pits require more labor and equipment. According to the survey, the average total cost of digging a typical pit (excluding the cost of the water pump) was \$385.

The costs of these investments are borne by the supporter. In some instances, miners can afford to pay their own costs, in which case they are said to “support themselves.” Often, the supporter is an outside investor. These investors are typically the licensed brokers who act as middlemen in the artisanal diamond mining sector. Miners sell the diamonds they find on their claims to brokers, who then sell them at a markup to dealers, usually in Monrovia, who export them.

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<sup>1</sup> All figures are in \$US.

## 2.2 COMPENSATION AND FINANCING ARRANGEMENTS

Compensation and financing is based on a set of informal but standard arrangements between the relevant parties. Diamond boys are not paid a wage, but rather work for the miners on contingency. The miner is entitled to half of the revenues from the diamonds, while the diamond boys split the remaining half in equal shares. Thus, the diamond boys are paid only in food and medicine unless diamonds are found on the claim. This arrangement was standard in every case that we observed, though diamond boys occasionally ask for small advances or additional food.

Miners are usually obligated to sell the diamonds they find in their pits directly to the supporter of the pit. The supporter and the miner agree on a price based on the expenses incurred by the supporter and the weight and quality of the stone. Unlike the hard and fast terms between miners and diamond boys, there do not seem to be any clearly defined standards as to what constitutes a fair price for supporters to pay the miners. The supporter will then sell the diamonds at a markup to a broker, or to a dealer if (as is typically the case) the supporter is in fact a broker. In some instances, miners also employ “field agents” or “field managers” who represent the miner at the site of claim and/or supervise the diamond boys in their work; these types of employees also work on a commission basis and are typically entitled to 5-10 percent of diamond revenues.

The nature of the artisanal diamond mining process creates significant tensions between miners, diamond boys, and brokers. Diamonds are small and hence easy to steal, and theft by diamond boys is a common occurrence and significant concern for miners and supporters. Diamond boys justify this behavior on the basis of the fact that they do the hard work, and also that they perceive themselves to be frequently mistreated by miners. The miners may thus employ field agents to monitor the diamond boys, or watch over their claims personally. As diamonds are most often found during the washing of the gravel, some miners will not supervise their diamond boys until this stage of the process.

Tension is evident between miners and supporters/brokers as well. Miners frequently complained that they believe the prices that they are being paid are unfair, while supporters and brokers complain that miners demand exorbitant prices for low-quality stones. Much of this tension arises because many miners have very little knowledge concerning diamond pricing or valuation, while brokers tend to have at least some expertise in this area.

Despite these tensions, it is also clear that diamond boys, miners, and brokers are keenly aware that their fortunes are intertwined. This was particularly evident in the fact that most of the diamond boys we spoke with indicated that the biggest problem they faced related to mining was not working conditions or payment, but the fact that miners are not able to attract adequate investment.

## 2.3 LICIT AND ILLICIT CLAIMS

Miners are legally required to obtain licenses for their claims. Class C licenses are required for manually dug pits at a cost of \$150 for a license plus a fee typically in the range of \$100 to \$150 for surveying. If construction equipment is used, a more expensive Class B license is required. Finally Class A licenses must be obtained for industrial producers. Licenses must be renewed each calendar year. To obtain a license for a new claim, a miner must obtain a recommendation from the local mining chairman, an informal leader in the mining community with authority over claims in the area. This recommendation must then be seconded by the general mining chairman, another informal authority with broader authority and responsibility. The miner can then submit his or her application and fees to the local mining agent for approval, following which the miner must travel to Monrovia to apply to the Ministry of Land, Mines, and Energy. One individual may hold up to four Class C licenses. Miners will often hold claims in geographically dispersed areas; for example, one individual had two claims near Lofa Bridge and two 50 kilometers distant in the Mano River area.

There are three kinds of unlicensed mining activity that were reported. First, miners who have previously held licenses for a claim sometimes fail to renew them even as they continue to mine the claim. Secondly, some miners are members of the local community who have never obtained licenses on their claims. In both of

these cases, both the local community and the mining chairperson tend to be aware of the claim, and to respect it. Thirdly, some illicit claims are the result of prospecting into new areas. Miners will often investigate new sites in remote areas where they do not hold licenses. If the site is found to be productive, the miner may or may not then apply for a license to formally establish the claim.

The majority of illicitly mined diamonds were said to be sold to licensed brokers. Typically, the brokers then falsely report the source of diamonds as licensed claims in the area, and the diamonds then enter the formal chain of custody at this point. In some instances, illicit diamonds are sold to smugglers or illegal brokers; this was mentioned most often in the context of diamonds stolen by diamond boys. However, even in these cases it was reported that it was more common for diamond boys to surreptitiously sell stolen diamonds to the local licensed broker, or to travel to another area and sell to the local broker or dealer there. In general, stakeholders reported that the price miners receive for legally mined diamonds does not differ substantially from the price for illegally mined diamonds.

The most important reason for not obtaining a license was said to be the cost. In addition, several miners reported long delays of up to six months in receiving their licenses even after they had paid the fee. Despite the fact that they are unwilling or unable to pay the \$150 to obtain a license, many unlicensed miners indicated that they would place significant value on having a license. Unlicensed miners still worry that someone else could obtain a license for their claim, despite the legal safeguards that protect the community from outsiders obtaining licenses without the permission of the local mining sub-chairman.





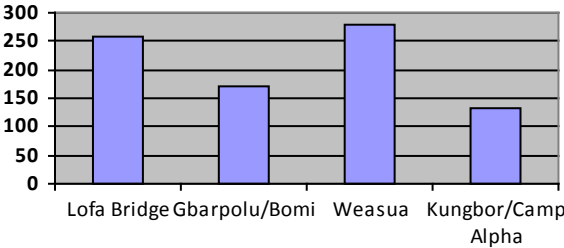
# 3.0 SURVEY RESULTS

## 3.1 OVERVIEW OF THE SURVEY

The final questionnaire instrument was developed following preliminary fieldwork in collaboration with staff from Tetra Tech ARD, Subah-Belleh Associates, and the team of enumerators. The questionnaire includes a total of 144 questions, with sections covering household demographic information and economic activity, mining activities, conflicts and security, policy awareness and perceptions, household assets, and opinions on mining-related issues. The questionnaire is included as an annex.

The survey was administered to a total of 826 households in February and March of 2011. The sample was drawn from four areas in Western Liberia. These were the PRADD project area near Lofa Bridge (Grand Cape Mount County), which was matched with a control area in Gbarpolu and Bomi Counties, and the second PRADD project area in Weasua Town (Gbarpolu County), which was matched with a nearby control area that contained the towns of Kungbor and Camp Alpha. The number of households from each area is shown in Figure 1.

**Figure 1**  
**No. of Households By Area**



An important consideration in collecting the data was that, as discussed in the previous section, the majority of miners in this area do not hold licenses and are thus mining illegally. As a result, special consideration was needed to assure miners that they would not face legal reprisal for participating in the survey in order to ensure that both licensed and unlicensed miners were adequately represented in the sample. This was accomplished by working closely with local authorities and conducting sensitization exercises in the survey communities prior to carrying out the survey. As a result, unlicensed miners appeared to show a strong willingness to participate, as 61.8 percent of the respondents were willing to divulge that they did not hold valid mining licenses.

It is important to highlight that we obtained conflicting information about the true proportion of the miners in the study area who hold valid licenses. In the course of fieldwork we obtained informal estimates from individual miners in a variety of locations that a range of 60-80 percent of active mining claims in the study areas are unlicensed. This is broadly consistent with the results of our survey (i.e., 61.8 percent of respondents indicated that they did not have valid licenses). However, official government records contradict these figures—according to records obtained from the ministry, the number of artisanal miners in the entire country who held valid licenses at the time of the survey was only approximately 300. Comparing the government records to our list of survey respondents, we found that only 26 of these were among our respondents, which would indicate that 97 percent of the miners we surveyed were unlicensed. The discrepancy between the official government records and our other sources of information are likely

explained by several factors. Certainly, despite our sensitization efforts, we expect that some unlicensed miners would be unwilling to disclose this to our survey enumerators and would untruthfully claim to hold licenses. However, because our survey results are similar to the estimates miners were providing in the field, it seems unlikely that this is the major source of the discrepancy. Alternatively, there may be a misunderstanding on the part of the miners as to what constitutes a valid license. Some miners who claimed to hold valid licenses may in fact have held expired licenses and thus would not appear on the official list of licensed miners. Regardless of the explanation, the survey results related to licensing of miners should be interpreted with caution.

### 3.2 BASIC DEMOGRAPHIC INFORMATION

Table 1 shows some basic demographic characteristics of the sample. The study area exhibits substantial ethnic diversity, with at least 16 different ethnicities present and no single ethnic group comprising more than 25.6 percent of the sample; 15.7 percent of the households report having migrated from elsewhere, while 10.4 percent are headed by women. Our sample households tend to be poor, with an average per capita income of \$329. Sixty-nine (69) percent of these households report having earned mining income from their claims over the past year, while other common income-generating activities are farming (41.6 percent) and small business (34.1 percent).

**Table 1: Basic Demographic Information**

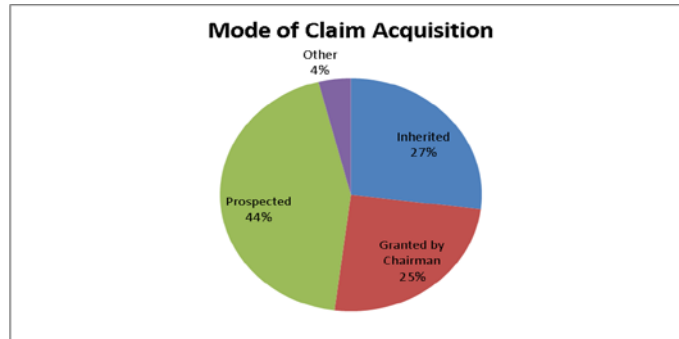
	Total
Household size	5.3
Median years of education	4.0
% female	10.4%
Tribe	
• Gola	25.6%
• Kpelle	14.1%
• Mandingo	13.7%
• Kissi	11.8%
• Other	34.8%
Migrant Households	15.7%
Household Income Per Capita	\$329
Households Earning Income from:	
• Mining own diamond claims	69.0%
• Other mining	11.7%
• Farming	41.6%
• Small business	34.1%
• Wages/Salary	5.7%
• Pensions	2.3%
• Remittances	8.0%
• Other	13.0%

### 3.3 MINING ACTIVITIES

Some key characteristics of the mining claims in the sample are illustrated in Figures 2-4. Most households hold a single mining claim, though a substantial number have multiple claims. Prospecting was the most common means of acquiring claims, with a lesser number of miners acquiring claims either from the mining chairman or by inheritance. Nonetheless, miners tend to have longstanding claims to the areas that they mine-

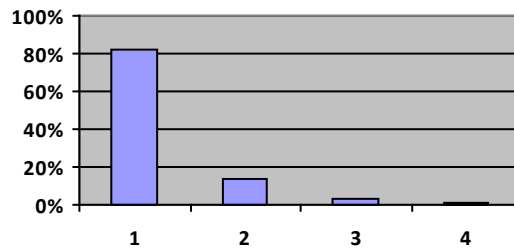
just over 15 years on average. Finally, miners reported having to travel 45.7 minutes on average to reach their claims.

**Figure 2**



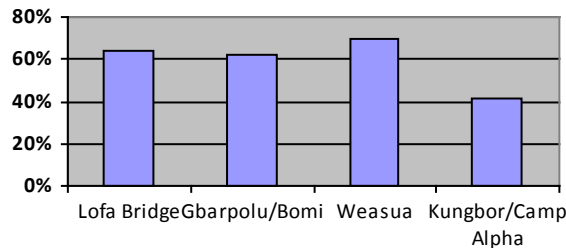
**Figure 3**

**No. of Claims by Household**



**Figure 4**

**% of Unlicensed Miners by Area**



Mining revenues, marketing, and financing are illustrated in Figures 5-7 and Table 2. Of the claims in the sample, 20 percent were reported inactive and an additional 21 percent were active but did not yield diamonds. The average revenue on active claims was \$1,277, with 5.4 percent of the claims yielding revenues in excess of \$5,000. Miners dug an average of 2.7 pits on each active claim, which yielded 11.1 diamonds per claim with an average weight of 0.86 carats. The mean price received was \$229 per carat. In terms of financing for their investments, slightly less than half of all miners used their own funds. Of the remainder, the majority obtained financing from relatives or other Liberians, with less than 5 percent being financed by non-Liberians. Miners sell their diamonds to licensed brokers slightly less than half the time.

Figure 5

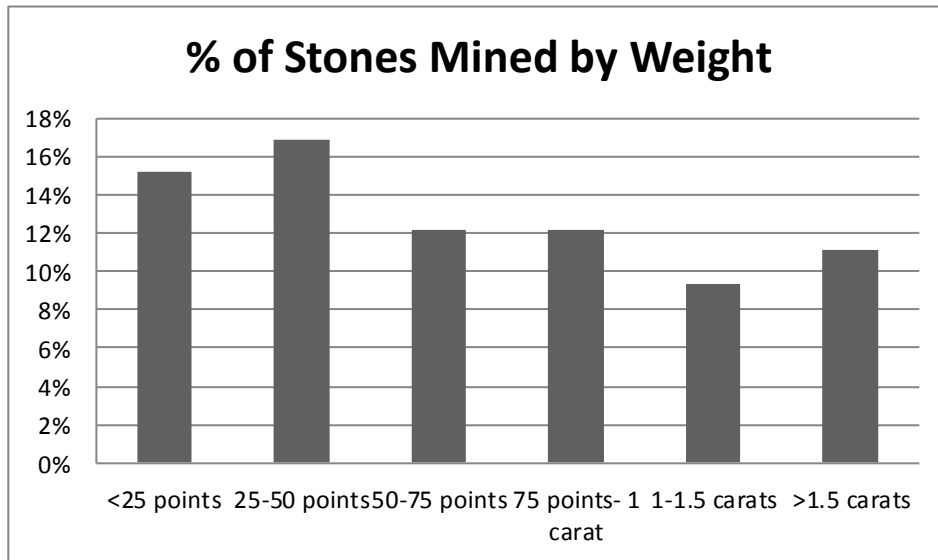


Figure 6

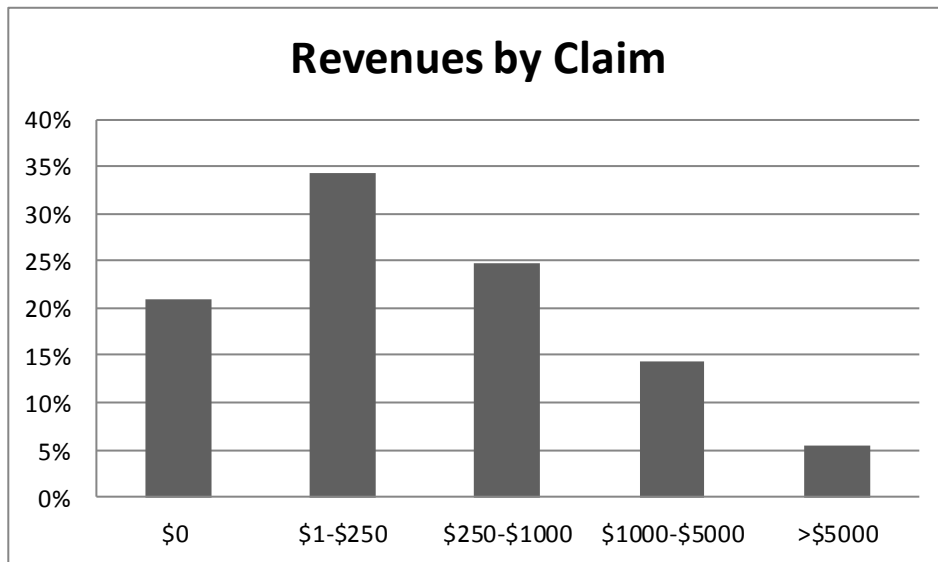
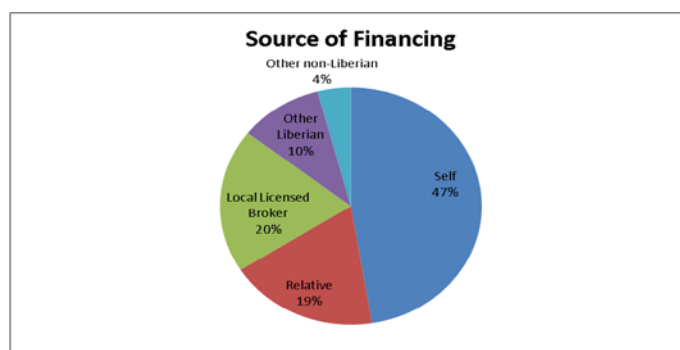


Figure 7



**Table 2: Mining Revenues and Marketing**

	All	Licensed Miners	Unlicensed Miners
Number of claims	1.24	1.29	1.2
Number of pits	2.71	2.97	2.51
Total diamond revenue	\$1335	\$1744	\$1024
No. of Stones	11.1	15.6	7.76
Approx. Avg. Carats Per Stone	0.86	0.94	0.792
Approx. Price per Carat	\$229	\$254	\$210
% of stones by weight			
• <25 points	15.2%	14.5%	15.8%
• 25-50 points	16.9%	14.7%	18.6%
• 50-75 points	12.2%	13.1%	11.4%
• 75 points- 1 carat	12.2%	11.6%	12.6%
• 1-1.5 carats	9.3%	10.0%	8.9%
• >1.5 carats	11.1%	14.1%	8.9%
Sold to:			
• Local licensed broker	47.1%	50.5%	43.6%
• Supporter who is not a licensed broker	23.2%	21.7%	24.7%
• Someone else	17.1%	18.9%	15.3%
Financial Supporter:			
• Self	46.0%	42.5%	49.5%
• Relative	17.9%	20.5%	15.3%
• Local licensed broker	18.8%	21.1%	16.5%
• Other Liberian	10.2%	10.0%	10.5%
• Other non-Liberian	3.7%	2.7%	4.7%

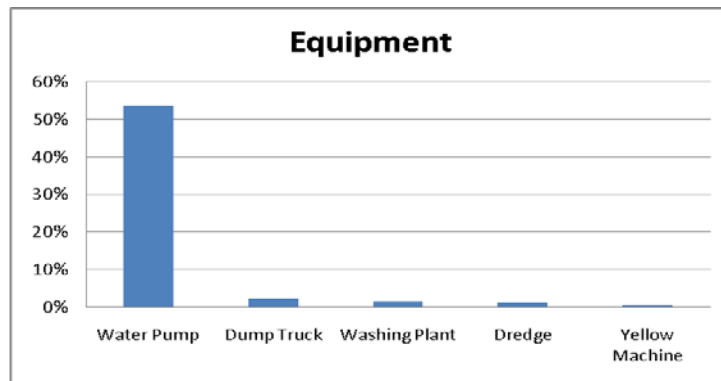
*Note: Claims on which no pits were dug in the previous season are excluded.*

Table 2 illustrates the differences in mining activities between the miners who reported having licenses as compared to those who did not. A more rigorous investigation of the impacts of having a license is conducted in the next section, but here we note that miners who claim to have licenses earned nearly twice as much from their claims as the unlicensed miners. The most important factor in this was that licensed miners found nearly 50 percent more stones on their claims. In addition, licensed miners dug more pits, found larger stones in the pits they dug, and received slightly higher prices on a per-carat basis. Somewhat surprisingly, licensed miners were only marginally more likely than unlicensed miners to sell their diamonds to a licensed broker. This is consistent with indications from our preliminary field work that many illegally mined diamonds enter the formal chain of custody when brokers purchase them and then misreport the origin.

As discussed in the previous section, mining investments take the form of “pits” that are dug on the miner’s claim. Characteristics at the level of the pit are shown in Table 3. Each pit earned an average of \$759 set against an average cost of \$385. The use of machinery is rare, as shown in Figure 8, with the exception of water pumps, which are used on over half of all pits. The depth of the pits as measured in shovels is shown in Figure 9, with an average digging time of 3.03 weeks. As expected, most pits employ four diamond boys, though there is some variation.

**Table 3: Pit Characteristics**

	All	Licensed Claims	Unlicensed Claims
Diamond revenue	\$759	\$890	\$617
Total costs incurred	\$385	\$483	\$284
Depth, shovels	2.06	2.26	1.86
Time to reach gravel, weeks	3.03	3.24	2.83
# of diamond boys employed	4.51	4.98	4.03

**Figure 8**

### 3.4 CONFLICTS AND SECURITY

The survey contained a number of questions about conflicts related to mining rights, which are summarized in Table 4. Conflicts over mining claims are common in the study area, with 18.6 percent of miners reporting having had at least one conflict related to their claims. The most common source of conflict is over the boundaries of claims, followed by disputes between local miners over who has rights to a particular claim. Less common are disputes with outsiders and disputes related to prospecting, which each accounted for 10.5 percent of the total conflicts. Miners also show significant concern about future conflicts, as 39.9 percent say they are “very worried” that they could have conflicts in the future.

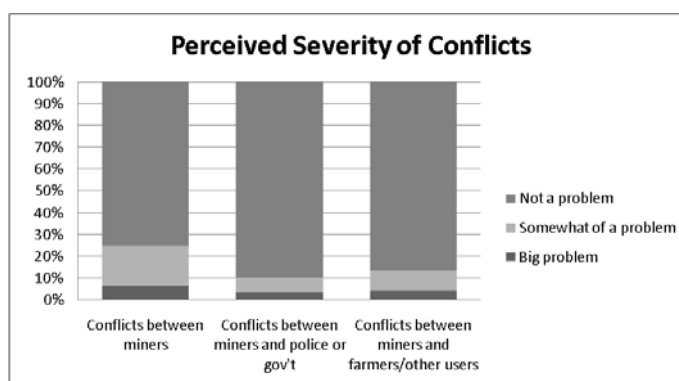
**Table 4: Incidence of Conflict**

	All	Licensed	Unlicensed
Ever had conflict	18.6%	23.1%	15.0%
Type of conflict:			
• Boundaries	44.2%	49.1%	38.1%
• Mining rights w/ local miner	24.2%	17.0%	33.3%
• Mining rights w/ outsider	10.5%	15.1%	4.8%
• Prospecting	10.5%	11.3%	9.5%
“Very worried” about future conflicts over claims	39.9%	29.9%	46.1%

Despite these concerns about the future, miners are less apt to view conflicts as a problem in their communities. Figure 10 illustrates miners’ responses to the question of whether each of three types of conflict is a problem in their area: conflicts between miners, conflicts between miners and the police or government, and conflicts between miners and farmers or other land users. In all three cases, at least three-quarters of the

miners responded that the type of conflict was not a problem in their area. Miners identified conflicts between miners as somewhat more of a problem than the other two types of conflict.

**Figure 10**



**Table 5: Conflict Resolution**

Conflict resolved by:	
• Ourselves	12.5%
• Informal mining chairman	21.3%
• Government mining agent	21.3%
• Police/courts	25.7%
• Someone else	2.2%
• Never resolved	9.6%

In terms of conflict resolution, Table 5 illustrates the variety of means that miners utilize. The informal mining chairman, the local government mining agent, and the police or courts were each used to resolve at least 20 percent of the conflicts that were reported. Just a little less than 10 percent of the conflicts were never resolved.

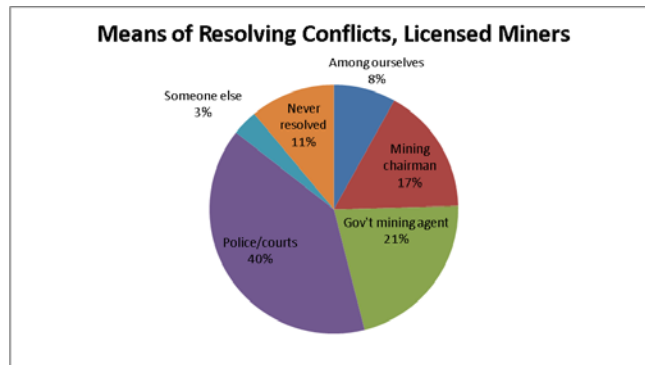
There are important differences between the experiences of conflict of miners who claimed to have licenses as compared to unlicensed miners. Interestingly, miners who claim to have licenses are over 50 percent more likely to have experienced a conflict compared to unlicensed miners. One possible explanation is that miners who have experienced conflicts then tend to seek out licenses in order to avoid future conflicts. Alternatively, as we have seen, licensed miners tend to hold more productive claims. Thus, licensed miners may experience more conflicts because it is more attractive to others to challenge the boundaries or rights to these more valuable claims. Finally, it may also be the case that the licensed miners are better able to defend their claims, so that unlicensed miners who faced conflicts in the past subsequently lost their claims as a result. Among the miners who have experienced conflicts, disputes with outsiders are significantly more common for licensed miners, while unlicensed miners tend to have more conflicts with local miners.

Despite the fact that miners who claimed to hold licenses experience more conflicts, unlicensed miners are more worried about conflicts in the future—46.1 percent of unlicensed miners reported that they are “very worried” about future conflicts compared to 29.9 percent of licensed miners.

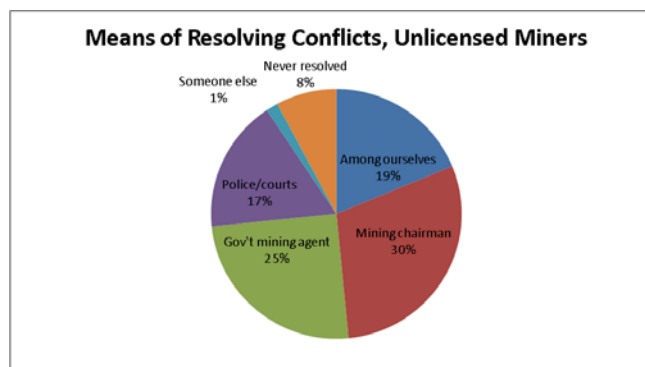
The means that miners use to resolve conflicts also differ substantially between the miners who claimed to hold licenses and those who did not. As would be expected, unlicensed miners are more likely to resolve disputes among themselves or with the local mining chairman, while those who claimed to hold licenses are more likely to involve the police or the courts. Unlicensed miners are also slightly more likely to take their disputes to the local government mining agent. This is somewhat surprising, as one might expect unlicensed

miners to avoid government officials, particularly in the instance of disputes. The fact that this does not appear to be the case indicates that government mining agents may play a somewhat complicated role in the community and may, in some cases, have established a significant amount of trust.

**Figure 11**



**Figure 12**



### 3.5 KIMBERLEY PROCESS AWARENESS

The survey also contained a number of questions that were intended to capture the extent of miners' knowledge about the Kimberley Process (KP). Miners were asked whether they had heard of the Kimberley Process, and those who answered affirmatively were administered a "quiz" to assess their knowledge of the provisions of the KP. The quiz consisted of four questions asking whether each of the following was part of the KP:

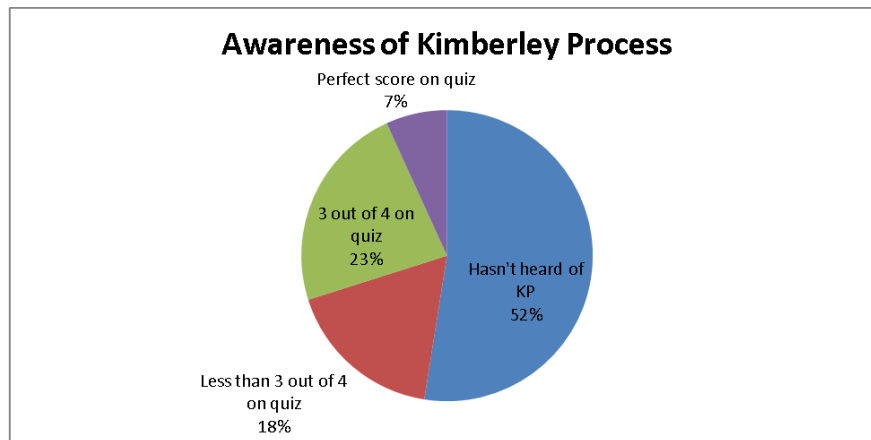
1. Getting a license for any claim that you are mining;
2. Asking the mining agent for the correct price of each diamond you find;
3. Registering all diamonds you find with the Regional Diamond Office; or
4. Giving a voucher to the broker when a diamond is sold.

The correct answers are that #1, 3, and 4 are part of the KP, while #2 is not; mining agents do not provide information related to pricing.

In general, awareness of the KP was limited, as illustrated in the figure below. Over half of the miners had never heard of the KP, while only 7 percent were able to answer all questions correctly. The results suggest that there is clearly a role for expanding awareness about the Kimberley Process in the study area.



**Figure 13**



### **3.6 MINER'S BELIEFS, ATTITUDES, AND CONCERNS**

The survey also contained a number of questions that asked miners for their opinions on a range of mining-related topics. These include constraints on mining activity, attitudes towards a potential cooperative microfinancing arrangement, attitudes about licensing, attitudes towards brokers, and beliefs about miners' responsibilities related to environmental degradation.

To assess the importance of various constraints on mining activity, miners were presented with a number of potential reasons as to why they did not mine more intensively than they did, and were asked to evaluate the importance of each reason. The results are shown in Figure 14. Labor availability and access to funds for investment were the most important reasons, with 76.5 percent and 82.4 percent, respectively, citing these as very important. Few miners indicated that their claims were not sufficiently productive to justify greater investment, with only 19.2 percent rating this concern as very important. Similarly, only 11.1 percent cited pursuing other opportunities as a very important reason limiting mining activity. The implication is that most miners believe that their claims are productive and would like to mine them more intensively than they do, but are unable to because of difficulty finding labor and investment funds.

To further investigate the role of financing constraints and potential solutions, miners were presented with a hypothetical scenario involving cooperatives and microfinance and were asked to rate their interest in participating. The scenario was described as an arrangement where 10 miners would form a cooperative among themselves, and the cooperative would take out a loan from a bank so that each member would receive \$1,000 to finance mining activities. The cooperative would then repay the total amount of the loans, with miners who found more diamonds repaying on behalf of those who found fewer diamonds. Fieldwork conducted prior to the survey suggested that miners were able to firmly grasp the scenario and its implications when it was explained to them carefully.

Figure 15 illustrates that miners responded with a high level of interest in a cooperative-based microfinance arrangement. Seventy-six (76) percent indicated that they would definitely be interested in participating, while a further 12 percent said that they were unsure but would consider such an arrangement. The implication is that cooperative-based lending as a solution to the financing constraint is appealing to the miners and warrants further exploration.

Figure 14

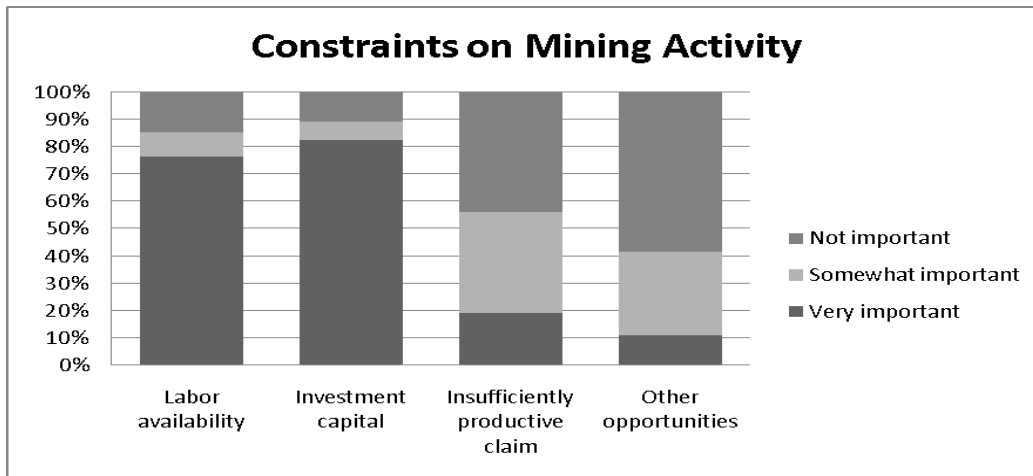
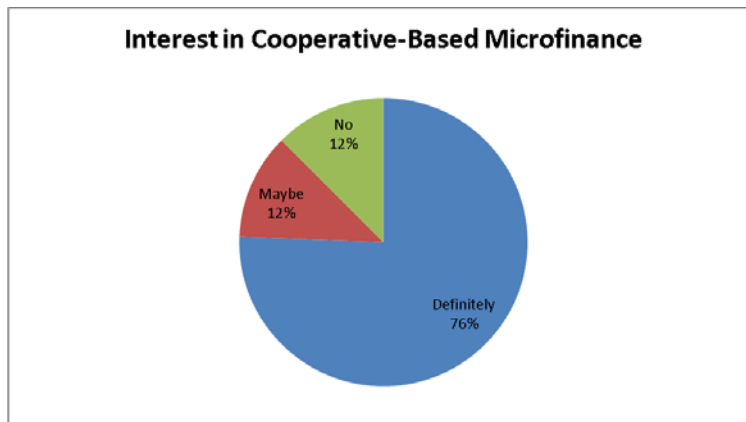


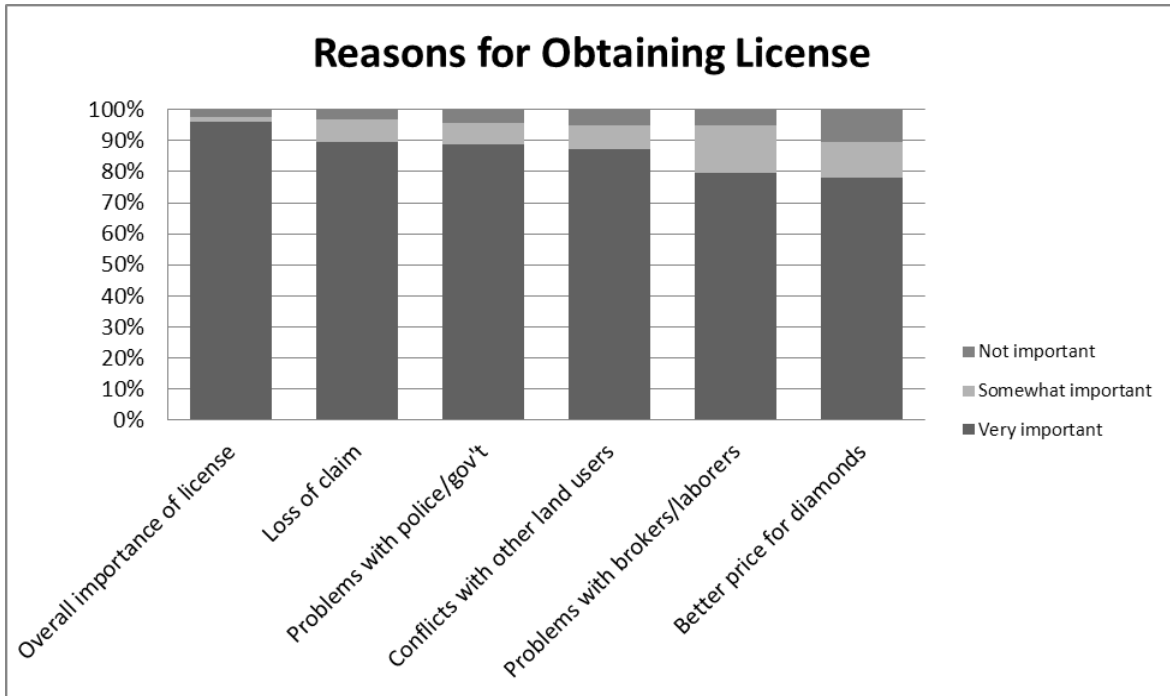
Figure 15



To explore attitudes related to mining licenses, miners were asked to evaluate the overall importance of having a mining license, as well as a number of specific reasons as to why a mining license might be desirable. In addition, miners who had chosen not to obtain licenses were asked to evaluate a number of possible reasons as to why they did not, and also to give the highest price that they would be willing to pay for a valid license.

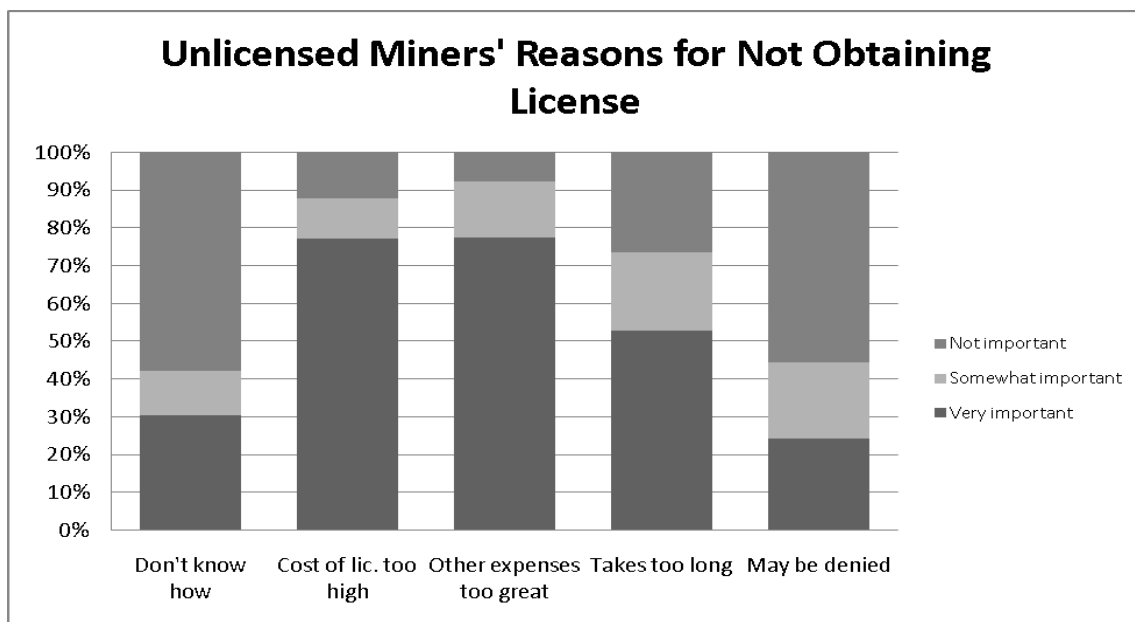
As Figure 16 shows, miners overwhelmingly believe that having a license is important, and tend to agree with all of the potential reasons that were presented to them. Preventing having one's claim taken by someone else was the most frequently cited reason. Obtaining a higher price was evaluated as the least important of the reasons presented, but 78.3 percent still indicated that this was a very important reason to obtain a license.

Figure 16



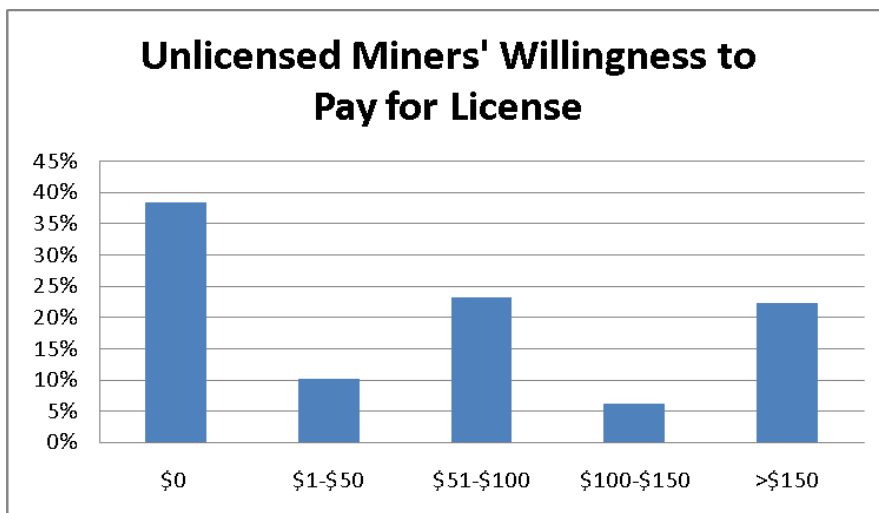
Despite the high degree of importance that miners attach to having licenses, as shown earlier, less than half of the miners in the sample report being in fact licensed. Figure 17 shows the importance that the miners who acknowledge being unlicensed attach to various factors in explaining why they have not obtained licenses. Costs both of the license itself as well as the additional expenses related to obtaining the license (e.g., travel to Monrovia) were cited most often as an important factor. In addition, nearly three-quarters of the unlicensed miners said that the delay in obtaining a license was at least somewhat important in their decision not to obtain a license. Just under half cited both lack of knowledge about how to obtain a license as well as the potential that their application could be denied as relevant reasons.

Figure 17



Since most unlicensed miners report that the \$150 cost of the license is a strong deterrent to obtaining one, the survey also asked the extent to which unlicensed miners might be willing to pay lower prices for a license. Unlicensed miners' willingness to pay is summarized in the Figure 18 below. As shown, 38.3 percent said that they would not be willing to pay for a license at all, while 39.5 percent would pay some amount that was less than the actual price of \$150. A substantial number of miners (22.2 percent) responded that they would be willing to pay more than the actual price of \$150, suggesting a lack of awareness of the actual price or possibly some difficulty in interpreting the question.

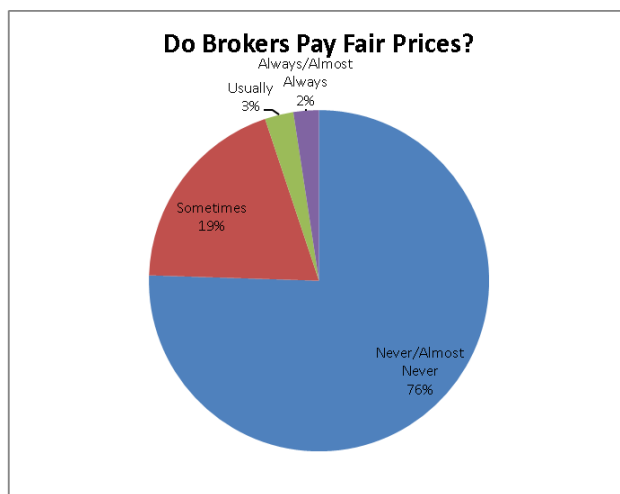
**Figure 18**



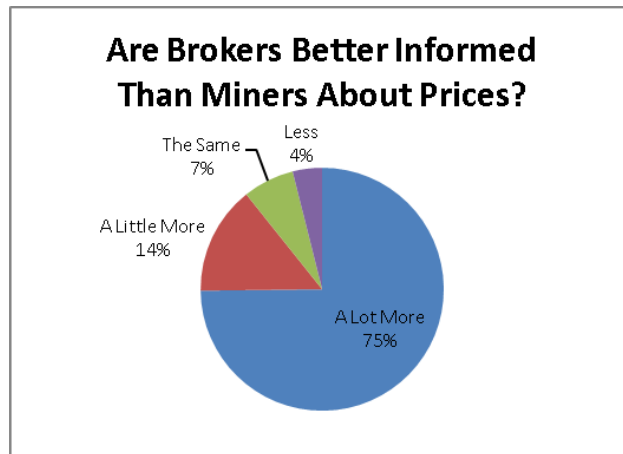
These results suggest that reducing the costs of obtaining a license, speeding up the process, and better informing miners about the procedures and costs of licenses would all be effective ways to expand formalization in the artisanal diamond mining sector in Liberia.

Two questions on the survey were designed to investigate the tensions between miners and the brokers to whom they sell their diamonds. Figures 19 and 20 indicate that miners overwhelmingly perceive brokers to pay unfair prices and have superior information. Seventy-six (76) percent believe that brokers never pay fair prices to miners, while only 5 percent say that brokers usually or always pay fair prices. Similarly, three-quarters of the miners responded that brokers are “a lot more” informed about diamond prices than miners are, with a further 14 percent saying that brokers are somewhat more informed.

**Figure 19**

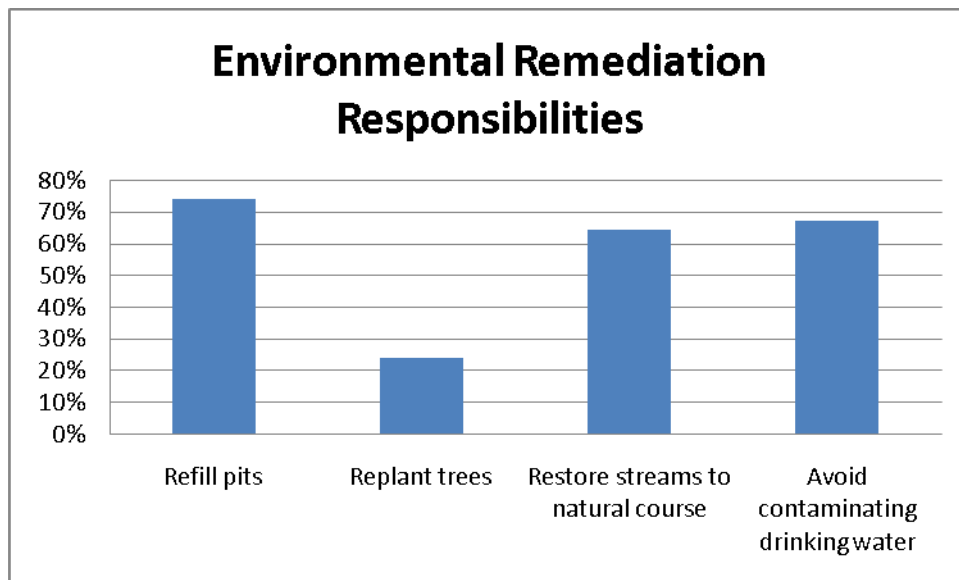


**Figure 20**



Finally, the survey included a question about miners' awareness of environmental issues and perceptions of their responsibilities. The following open-ended question was posed to the miners: "Some people say that mining activities can cause problems for our rivers, forests, and farmland. Is there anything you think miners should do about this?" Responses were coded to indicate whether miners had mentioned each of four common remediation measures in their responses, with the results shown below. Most perceived that miners have a responsibility to refill pits after mining, restore streams that have been diverted to their natural course, and avoid washing gravel in water sources used for drinking. However, only a minority mentioned replanting trees that have been cut down.

**Figure 21**





# 4.0 ECONOMETRIC ANALYSIS

The summary statistics presented in the previous section offer a useful snapshot of the survey responses. In order to investigate the causal relationships suggested by the data, we conducted three econometric analyses. First, we consider what characteristics determine whether miners report that they have obtained licenses or not. Second, we examine the factors that determine the prices that miners report receiving for their diamonds. Third, we look at the determinants of investment decisions on the part of miners. Finally, we consider the factors that drive diamond revenues that miners yield from their claims. Throughout, our focus is on how characteristics that could be affected by PRADD programming influence these outcomes. The statistical results are presented in Tables 1-3 of the technical appendix. For the purposes of this report, we omit the technical details and summarize the main findings of the analyses as follows.

**Likelihood of having a mining license:** Knowledge of the Kimberley Process is a strong predictor of whether miners hold licenses. Those who are aware of the KP are 15 percent more likely to have licenses, while those who passed the quiz were 26 percent more likely to have licenses. Thus, expanding awareness of the KP might cause more miners to formalize their claims. In addition, miners who have had their claims for a longer period of time are more likely to have licenses. Migrants are less likely to have licenses, as are miners who acquired their claims by prospecting as opposed to other means. Licenses were much more common among respondents in the Kungbor/Camp Alpha area compared to other areas. Finally, miners who have had conflicts in the past are more likely to have licenses.

**Determinants of diamond prices:** After controlling for other characteristics of the stones, none of our variables related to PRADD programming had a significant influence on the price that miners received for their diamonds. These included having a license, registering diamonds with the Government Diamond Office (GDO), selling to licensed brokers, keeping records of diamond sales, and knowledge of the KP. Conversely, weight, quality, and color were strongly associated with price—stones of “dirty” quality fetched lower prices, while blue, yellow, and white stones received higher prices.

**Determinants of diamond revenues on actively mined claims:** Some variables of programmatic relevance were significant determinants of the amount of diamond revenue derived from actively mined claims. Miners who registered their diamonds with the GDO earned more revenues, as did those who sold to licensed brokers. However, neither holding a license, keeping records, nor knowledge of the KP significantly increased revenues. In terms of the control variables, underwater claims earned higher revenues, presumably because only productive underwater claims would be mined. The length of time the miner has held the claim was positively associated with revenue, while migrants earned less revenue. Finally, claims in the Gbarpolu/Bomi area were significantly less productive than those in the other areas.





# APPENDIX TABLE I: LIKELIHOOD OF HAVING A MINING LICENSE

	(1)	(2)
Distance to claim	-0.0137 (0.0115)	-0.0119 (0.0116)
Length of tenure	0.00622*** (0.00188)	0.00616*** (0.00173)
Female headed household	0.0917 (0.0778)	0.0832 (0.0774)
Migrant	-0.151*** (0.0474)	-0.136*** (0.0490)
Acq. by prospecting	-0.128** (0.0571)	-0.107* (0.0585)
Acq. by inheritance	-0.0594 (0.0462)	-0.0391 (0.0506)
Non-mining income	-0.0133 (0.00958)	-0.0104 (0.00965)
Inactive claim	-0.131 (0.0885)	-0.139* (0.0829)
Investments self-supported	-0.0566 (0.0522)	-0.0675 (0.0504)
Conflict ever experienced	0.145*** (0.0546)	0.169*** (0.0551)
Aware of KP	0.147*** (0.0536)	
Perfect score on KP test		0.258*** (0.0817)
Mining revenue from claim	0.00292 (0.0104)	0.00751 (0.0105)
Lofa Bridge Area	-0.288*** (0.0863)	-0.281*** (0.0927)
Weasua Town Area	-0.235*** (0.0906)	-0.204** (0.0998)
Gbarpolo/Bomi Area	-0.292*** (0.101)	-0.281*** (0.106)
Pseudo r-squared	.106	.105

\*\*\* p < .01, \*\* p < .05, \* p < .10

Standard errors clustered by town in parentheses

Probit regression with marginal effects reported



# APPENDIX TABLE 2. DETERMINANTS OF DIAMOND PRICES

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Weight	1.221*** (0.119)	1.218*** (0.120)	1.223*** (0.119)	1.221*** (0.120)	1.221*** (0.119)	1.224*** (0.119)	1.220*** (0.119)
Wt. squared	-0.0807*** (0.0172)	-0.0804*** (0.0172)	-0.0809*** (0.0172)	-0.0809*** (0.0172)	-0.0807*** (0.0172)	-0.0810*** (0.0171)	-0.0806*** (0.0172)
Color: white	0.286*** (0.104)	0.284*** (0.104)	0.282*** (0.104)	0.271*** (0.103)	0.286*** (0.104)	0.285*** (0.104)	0.287*** (0.104)
Color: blue	0.320** (0.157)	0.318** (0.158)	0.316** (0.158)	0.313** (0.154)	0.319** (0.158)	0.317** (0.157)	0.321** (0.157)
Color: yellow	0.265* (0.148)	0.262* (0.148)	0.262* (0.148)	0.254* (0.148)	0.265* (0.148)	0.266* (0.148)	0.267* (0.148)
Shape: flat	-0.107 (0.0946)	-0.107 (0.0947)	-0.103 (0.0946)	-0.109 (0.0948)	-0.106 (0.0951)	-0.108 (0.0942)	-0.105 (0.0951)
Quality: not clean	-0.128 (0.107)	-0.126 (0.106)	-0.129 (0.107)	-0.126 (0.107)	-0.128 (0.107)	-0.129 (0.107)	-0.127 (0.107)
Quality: dirty	-0.309* (0.168)	-0.312* (0.168)	-0.305* (0.167)	-0.305* (0.168)	-0.309* (0.168)	-0.308* (0.167)	-0.308* (0.168)
Non-mining income	0.0155 (0.0197)	0.0152 (0.0197)	0.0149 (0.0199)	0.0163 (0.0197)	0.0155 (0.0197)	0.0173 (0.0197)	0.0152 (0.0197)
Female headed household	-0.00625 (0.137)	-0.00608 (0.136)	-0.00192 (0.137)	-0.0191 (0.136)	-0.00687 (0.135)	-0.00777 (0.137)	-0.00744 (0.136)
Unlicensed miner		-0.0361 (0.103)					
Reg. diamonds w/ GDO			-0.0553 (0.123)				
Sells to lic. broker				0.101 (0.107)			

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Usually/always keeps records					0.00721		
Self-Reports KP awareness					(0.136)	-0.0712	
Passed KP test						(0.104)	0.0684
Lofa Bridge Area	0.170	0.182	0.154	0.154	0.170	0.178	0.166
	(0.161)	(0.165)	(0.161)	(0.162)	(0.161)	(0.161)	(0.161)
Weasua Town Area	0.241	0.248	0.252	0.246	0.241	0.261*	0.239
	(0.154)	(0.156)	(0.162)	(0.155)	(0.155)	(0.156)	(0.155)
Gbarpolo/Bomi Area	-0.0603	-0.0484	-0.0679	-0.0520	-0.0602	-0.0697	-0.0605
	(0.175)	(0.179)	(0.173)	(0.175)	(0.175)	(0.173)	(0.175)
Constant	3.415***	3.430***	3.435***	3.368***	3.415***	3.441***	3.414***
	(0.198)	(0.202)	(0.203)	(0.208)	(0.198)	(0.200)	(0.198)
Observations	1001	1001	1001	1001	1001	1001	1001
R-squared	0.458	0.458	0.458	0.459	0.458	0.458	0.458

\*\*\* p < .01, \*\* p < .05, \* p < .10

Standard errors clustered by individual miner in parentheses

Dependent variable is the log of the price received for the two largest diamonds found in each pit

# APPENDIX TABLE 3. DETERMINANTS OF MINING REVENUES ON ACTIVELY MINED CLAIMS, TOBIT REGRESSION RESULTS

	(1)	(2)	(3)	(4)	(5)	(6)
Distance to claim	0.122 (0.127)	0.123 (0.124)	0.126 (0.108)	0.130 (0.124)	0.106 (0.125)	0.121 (0.128)
Length of tenure	0.0268** (0.0108)	0.0252** (0.0116)	0.0226** (0.0113)	0.0275*** (0.0104)	0.0265** (0.0107)	0.0269** (0.0104)
Female headed household	0.0939 (0.392)	0.117 (0.358)	-0.156 (0.384)	0.0666 (0.422)	0.0897 (0.417)	0.0877 (0.415)
Non-mining income	0.103 (0.0782)	0.111 (0.0849)	0.119 (0.0731)	0.101 (0.0781)	0.108 (0.0807)	0.107 (0.0731)
Underwater claim	1.213*** (0.411)	1.122*** (0.405)	1.118** (0.521)	1.111** (0.447)	1.218*** (0.439)	1.228*** (0.404)
Pit depth	0.0852 (0.118)	0.0864 (0.114)	0.0370 (0.104)	0.0857 (0.111)	0.0882 (0.106)	0.0823 (0.107)
Acq. by prospecting	-0.377 (0.425)	-0.350 (0.434)	-0.459 (0.363)	-0.355 (0.404)	-0.398 (0.414)	-0.394 (0.437)
Migrant	-1.104* (0.637)	-1.231** (0.586)	-1.086* (0.567)	-1.075* (0.630)	-1.124* (0.629)	-1.081* (0.593)
Unlicensed miner	0.0462 (0.542)					

	(1)	(2)	(3)	(4)	(5)	(6)
Registered diamonds with GDO		2.204*** (0.394)				
Sells to licensed broker			1.962*** (0.394)			
Usually/always keeps records				0.771 (0.563)		
Passed KP test					-1.226** (0.538)	
Conflict ever experienced						-0.269 (0.942)
Lofa Bridge Area	-0.717 (0.704)	-0.402 (0.667)	-1.183** (0.555)	-0.652 (0.662)	-0.635 (0.630)	-0.672 (0.649)
Weasua Town Area	0.334 (0.618)	-0.112 (0.570)	0.431 (0.474)	0.309 (0.588)	0.393 (0.579)	0.353 (0.573)
Gbarpolo/Bomi Area	-2.141*** (0.727)	-1.997*** (0.740)	-2.144*** (0.583)	-2.090*** (0.706)	-2.147*** (0.711)	-2.141*** (0.691)
Constant	3.248*** (0.703)	2.943*** (0.772)	2.965*** (0.666)	3.155*** (0.767)	3.347*** (0.776)	3.304*** (0.816)
No. of obs.	524	524	524	524	524	524
R-squared	0.123	0.154	0.158	0.127	0.128	0.123

\*\*\* p < .01, \*\* p < .05, \* p < .10

Standard errors clustered by town in parentheses

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